

**GLERL**  
Great Lakes Environmental Research Laboratory



*Record high water levels for Lake Ontario in May, June, and July caused widespread property damage and flooding.. Credit: U.S. Army Corps of Engineers, Buffalo District.*

## Great Lakes Water Levels - September 2017

The Great Lakes, their connecting waterways, and their watersheds, comprise the largest lake system on the planet. The monthly, seasonal, and annual average surface water elevations of the lakes fluctuate in response to a variety of factors. Changing water levels can have both positive and negative impacts on water dependent industries such as shipping, fisheries, tourism and coastal infrastructure such as coastal roads, piers, and wetlands. NOAA Great Lakes Environmental Research Laboratory (GLERL) research on water levels in the Great Lakes analyzes components of the Great Lakes water cycle (runoff, over-lake precipitation, over-lake evaporation) to improve models, which are used by agencies and industry for water management planning.

### High Water!

Water levels on all of the Great Lakes are well above average. Extreme conditions in spring of 2017 produced flooding and widespread damage at the downstream end of the basin—Lake Ontario and the St. Lawrence River. Though these very large spring water supplies contributed, the set-up for this high water crisis was several years in the making.

Due to the inter-connectedness of the Great Lakes, our current high waters have been developing since the spring of 2013, when a record-setting two-year rise in water levels began on the upper Great Lakes. That unprecedented 0.6 meter (Lake Superior) and 1.0 meter (Lakes Michigan and Huron) rise from 2013 through 2015, set the stage for the high waters and flooding of spring and summer 2017.

The unusually large water supplies of spring 2017 produced levels on all of the Great Lakes that are significantly above their long-term averages. Extreme runoff in the Ontario and surrounding basins produced record high water levels, widespread property damage, and flooding in New York state as well as in Montreal. Record high levels were set for Lake Ontario in May, June, and July. Lake Erie was less than 15 cm from its record high in May, and Lake Superior was only 7 cm below its highest level for that month in July.

Lake	April	May	June
Superior	160 %	120 %	130 %
Michigan-Huron	150 %	130 %	140 %
Erie	140 %	230 %	120 %
Ontario	135 %	220 %	200 %

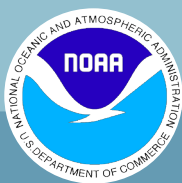
*Above: % of Average 2017 Net Basin Supply. Source: Detroit District Corps of Engineers; Average based on 1900-2008. A fact sheet examining the hydrologic drivers of the Lake Ontario/St. Lawrence River flooding can be found at [www.glerl.noaa.gov/pubs/brochures/Lake\\_Ontario\\_Infographic.png](http://www.glerl.noaa.gov/pubs/brochures/Lake_Ontario_Infographic.png).*

Lake	August 2012	August 2017	Difference	August 2017 Compared with Record High
Superior	183.27 m	183.78 m	+ 51 cm	183.91 m (1985); -13 cm
Michigan-Huron	175.97 m	177 m	+ 103 cm	177.50 m (1986); -50 cm
St. Clair	174.85 m	175.66 m	+ 19 cm	175.96 m (1986); -30 cm
Erie	174.04 m	174.70 m	+ 66 cm	174.98 m (1985); -28 cm
Ontario	74.76 m	75.43 m	+ 67 cm	75.81 m (2017); -38 cm

*Above: Comparison of August 2012, August 2017, and Record High Levels.*

### FOR MORE INFORMATION

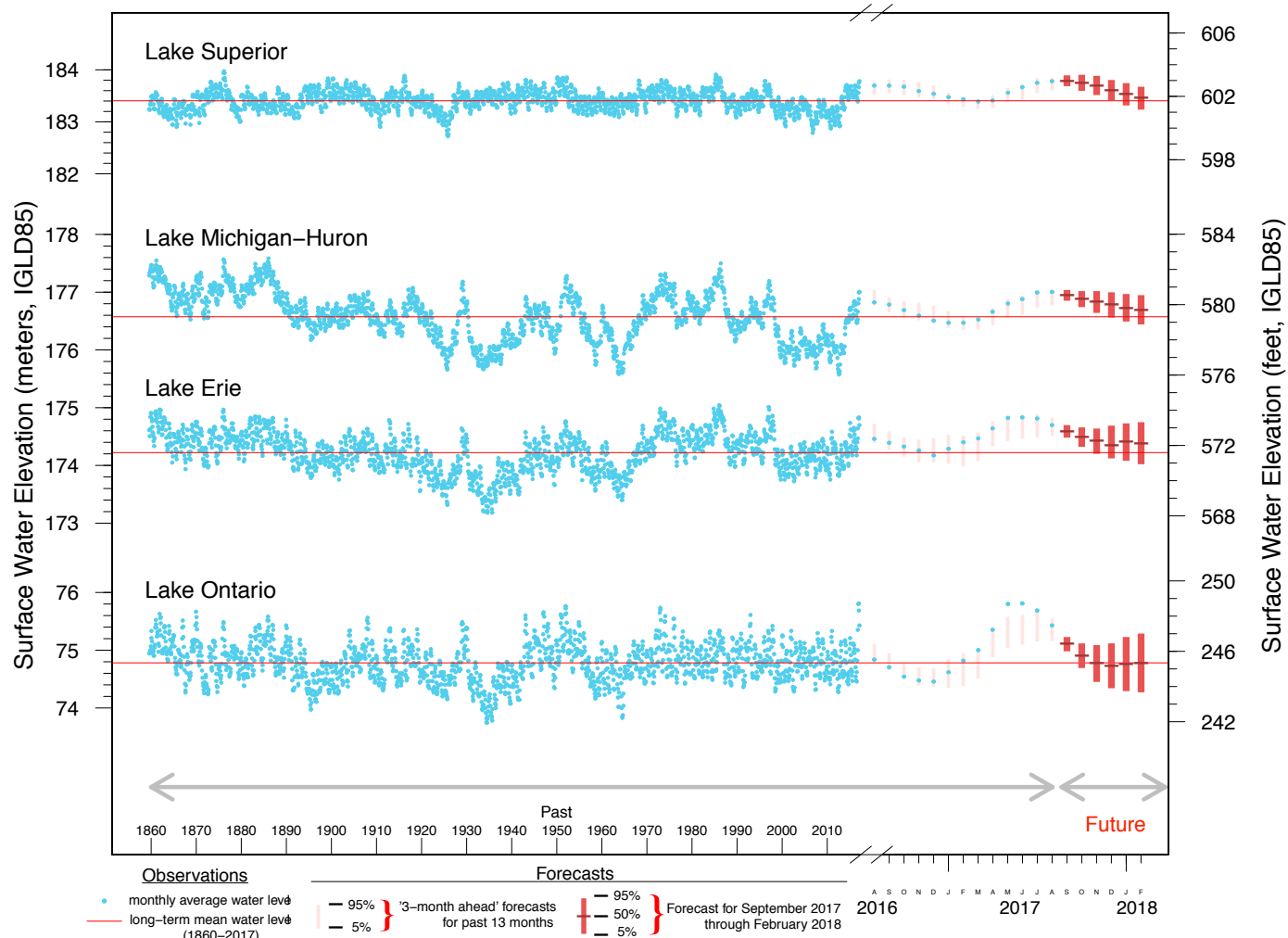
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## The current outlook for Great Lakes water levels - September 2017



The official 6-month forecast generated by the U.S. Army Corps of Engineers on September 6 indicates that the water levels of all of the Great Lakes are expected to follow their typical seasonal trends near or above average levels, into winter of 2018. The forecast suggests that levels on Lakes Michigan and Huron may reach their seasonal minimums at slightly higher levels than last year; while other lakes' winter levels will be similar to last year. The Corps' forecast is coordinated with Environment and Climate Change Canada each month. ([www.lre.usace.army.mil/Missions/GreatLakesInformation/GreatLakesWaterLevels/WaterLevelForecast/MonthlyBulletinofGreatLakesWaterLevels.aspx](http://www.lre.usace.army.mil/Missions/GreatLakesInformation/GreatLakesWaterLevels/WaterLevelForecast/MonthlyBulletinofGreatLakesWaterLevels.aspx)).



The uncertainty expressed in the forecast shown above is based on observed weather patterns and Great Lakes water levels, along with NOAA Climate Prediction Center's regional forecasts. The 5% and 95% bands are expected to contain the observed water level 90% of the time.

### How are water levels predicted in the Great Lakes?

Forecasts of Great Lakes monthly-average water levels are based on computer simulation models, including some from NOAA GLERL, along with more than 100 years of data from past weather and water level conditions. The official 6-month forecast is produced each month through a binational partnership between the U.S. Army Corps of Engineers and Environment and Climate Change Canada. NOAA GLERL's research on the water balance of the Great Lakes plays an important role in improving these forecasts. The most important variables are over-lake precipitation, over-lake evaporation, and runoff. NOAA GLERL is doing cutting-edge research through modeling and observations to better quantify over-lake evaporation—the most uncertain aspect of predicting lake levels. The sum of these variables ("net" supply of water to the basin) is routed through the lakes and connecting channels to produce a probabilistic water level forecast.